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YIELD OF WHITE SPRUCE AND BALSAM FIR IN AN UNDISTURBED STAND, DUCK MOUNTAIN, MANITOBA

by
R. T. Pike

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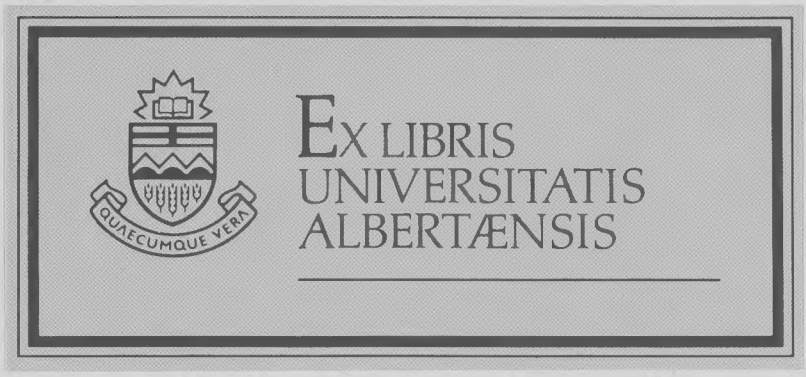
Forest Research Division
Technical Note No. 11
1955



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YIELD OF WHITE SPRUCE AND BALSAM FIR IN AN UNDISTURBED STAND, DUCK MOUNTAIN, MANITOBA

Project M.S. 11

by

R. T. Pike

A permanent sample plot, 0·6 acre in size, was established with tagged trees in 1921 on an island in Singoosh Lake (51° 36′ N, 101° 05′ W) to study the yield and reproduction of white spruce *(Picea glauca* (Moench) Voss) and balsam fir (*Abies balsamea* (L.) Mill) in an undisturbed stand.

In 1921, white spruce, one to 21 inches in diameter and up to 85 feet in height, varied in age from 30 to 140 years; balsam fir was 30 to 65 years of age, one to 12 inches in diameter and up to 60 feet in height. The spruce were sound but limby; the fir, which formed the understory, were suppressed and showed a high incidence of heart rot.

Table 1 shows conditions on the plot in 1921 and 1946.

TABLE 1.—STAND—PER ACRE 1921 and 1946

Diameter Class	White Spruce		Balsam Fir		Hardwoods		Totals	
	1921	1946	1921	1946	1921	1946	1921	1946
Number of Trees								
1— 3....	23	1	227	18	3	0	253	19
4— 9....	145	50	85	68	22	4	252	122
10—21....	89	85	6	0	0	1	95	86
	257	136	318	86	25	5	600	227
Basal Area—Square Feet								
1—21....	126	107	25	11	5	3	156	121
Total Volume—Cubic Feet								
1—21....	3,626	3,321	464	202	106	62	4,196	3,585
Volume F.B.M.—10″ d.b.h. and over								
10—21....	13,283	15,750	537	0	0	0	13,820	15,750

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During the twenty-five-year period the number of trees decreased from 600 to 227; in 1946 there were 121 fewer white spruce, 232 fewer balsam fir and 20 fewer hardwoods. Based on total number of trees the percentage composition in 1921 was 43 per cent and 53 per cent, respectively, for spruce and balsam fir which changed to 60 per cent and 37 per cent by 1946. There was no ingrowth in the plot during the period.

The total basal area of each species was less in 1946 than in 1921. White spruce decreased by 15 per cent and balsam fir by 56 per cent.

Volumes, mortality, gross and net increments in total cubic feet and in board feet are shown in Table II.

TABLE II.—VOLUME, MORTALITY, GROSS AND NET INCREMENTS 1921 to 1946
(per acre)

Species	Volume Living		Mortality	Increment	
	1921	1946	1921-1946	Gross	Net
Total Cubic Feet 1" d.b.h. and over					
Spruce	3,626	3,321	1,406	1,101	−305
Fir	464	202	506	244	−262
F.B.M. 10" d.b.h. and over (Int. Rule)					
Spruce	13,283	15,750	4,067	6,534	2,467
Fir	537	0	713	176	−537

In terms of total volume, the loss from mortality in both spruce and balsam fir exceeded the total increment, so that by 1946 there was a net loss of 305 cubic feet in spruce and 262 cubic feet in fir. All balsam fir over 9 inches d.b.h. died during the twenty-five-year period. However, merchantable board foot volume of the larger spruce (10 to 21 inches d.b.h.) continued to increase during the period at the rate of almost 100 b.f. per acre per year, which is equivalent to the mean annual increment of the stand over a period of about 170 years. The continuation of this relatively high increment in the future is most unlikely as the stand is over-mature and disintegrating.

TABLE III.—REPRODUCTION

Number of Seedlings per Acre

Species	1921	1946
White spruce	111	0
Balsam Fir	592	550
Total	703	550

The spruce and fir seedlings present in 1921 died during the period and were replaced by a new crop of balsam fir. The balsam fir seedlings present in 1946 are from one to 2·5 feet in height and from 4 to 10 years old. They have an unhealthy appearance, and are suppressed and slow-growing. Their condition results largely from browsing by deer.

This sample of an overmature white spruce and balsam fir stand will be reserved from cutting indefinitely, and the growth and successional development followed by means of observations and measurements at 10-year intervals.

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